

09/588,292

Atty Docket: 10559-398001/P10335

Amendments to the Claims

Claim 1. (currently amended) A method of enhancing an image, comprising:
first, smoothing the image using a sharply peaked filter to produce a smoothed image;
detecting an edge in the smoothed image; and
performing lowpass filtering on the smoothed image to produce an enhanced image,
wherein lowpass filtering is performed using a high frequency cutoff filter only on non-edge
areas of the smoothed image as determined by the edge detection.

; and

~~detecting an edge in the smoothed image.~~

Claim 2. (original) The method of claim 1, wherein smoothing comprises:
applying a two-dimensional filter to a pixel in the image;
storing a pixel processed by the two-dimensional filter in the smoothed image; and
repeating storing and applying for one or more other pixels in the image.

Claim 3. (original) The method of claim 1, wherein performing lowpass filtering comprises:

applying a one-dimensional filter to a pixel in the smoothed image;
storing a pixel processed by the one-dimensional filter in the enhanced image; and
repeating storing and applying for one or more other pixels in the smoothed image.

Claim 4 (canceled).

Claim 5. (canceled)

Claim 6. (currently amended) The method of claim ~~5~~ 1, wherein detecting the edge comprises applying an edge filter to the smoothed image.

09/588,292

Atty Docket: 10559-398001/P10335

Claim 7. (currently amended) A method of enhancing an image, comprising:
smoothing the image using a sharply peaked filter to produce a smoothed image;
performing lowpass filtering using a high frequency cutoff filter on the smoothed image
to produce an enhanced image; and
applying a median filter to the enhanced image, wherein the median filter is designed to
reduce artifacts on the enhanced image.

Claim 8. (currently amended) The method of claim 7, further comprising detecting edges
in the smoothed image, wherein the median filter is applied only to non-edge areas of the
enhanced image.

Claim 9. (currently amended) A method of performing inverse halftoning on a halftoned
image, comprising:
smoothing the halftoned image using a sharply peaked two-dimensional filter to produce
a smoothed image;
detecting edge areas in the smoothed image;
performing lowpass filtering using a high frequency cutoff filter on non-edge areas of the
smoothed image; and
generating an enhanced image comprised of the edge areas of the smoothed image and
lowpass-filtered non-edge areas of the smoothed image.

Claim 10. (previously presented) The method of claim 9, further comprising applying
a median filter to non-edge areas of the enhanced image, wherein the median filter is designed to
reduce artifacts in the enhanced image.

Claim 11. (currently amended) An article comprising a machine-readable medium
that stores machine-executable instructions for enhancing an image, the instructions causing a
machine to:

first, smooth the image using a sharply peaked filter to produce a smoothed image;

09/588,292

Atty Docket: 10559-398001/P10335

detect edge areas in the smoothed image; and
perform lowpass filtering using a high frequency cutoff filter on the smoothed image to produce an enhanced image, wherein lowpass filtering is performed only on non-edge areas of the smoothed image as determined by the edge detection. ~~and~~
~~detect an edge in the smoothed image.~~

Claim 12. (original) The article of claim 11, wherein smoothing comprises:
applying a two-dimensional filter to a pixel in the image;
storing a pixel processed by the two-dimensional filter in the smoothed image; and
repeating storing and applying for one or more other pixels in the image.

Claim 13.(original) The article of claim 11, wherein performing lowpass filtering comprises:

applying a one-dimensional filter to a pixel in the smoothed image;
storing a pixel processed by the one-dimensional filter in the enhanced image; and
repeating storing and applying for one or more other pixels in the smoothed image.

Claim 14. (canceled)

Claim 15. (canceled)

Claim 16. (currently amended) The article of claim ~~15~~ 11, wherein detecting the edge comprises applying an edge filter to the smoothed image.

Claim 17. (currently amended) An article comprising a machine-readable medium that stores machine-executable instructions for enhancing an image, the instructions causing a machine to:

first, smooth the image using a sharply peaked filter to produce a smoothed image;

09/588,292

Atty Docket: 10559-398001/P10335

perform lowpass filtering using a high frequency cutoff filter on the smoothed image to produce an enhanced image; and

apply a median filter to the enhanced image, wherein the median filter is designed to reduce artifacts on the enhanced image.

Claim 18. (currently amended) The article of claim 17, further comprising instructions that cause the machine to detect edge areas in the smoothed image, wherein the median filter is applied only to non-edge areas of the enhanced image.

Claim 19. (currently amended) An article comprising a machine-readable medium that stores machine-executable instructions for performing inverse halftoning on a halftoned image, the instructions causing a machine to:

first, smooth the halftoned image using a sharply peaked two-dimensional filter to produce a smoothed image;

detect edge areas in the smoothed image;

perform lowpass filtering using a high frequency cutoff filter on non-edge areas of the smoothed image; and

generate an enhanced image comprised of the edge areas of the smoothed image and lowpass-filtered non-edge areas of the smoothed image.

Claim 20. (previously presented) The article of claim 19, further comprising instructions that cause the machine to apply a median filter to non-edge areas of the enhanced image, wherein the median filter is designed to reduce artifacts in the enhanced image.

Claim 21. (currently amended) An apparatus for enhancing an image, comprising:
a memory that stores executable instructions; and
a processor that executes the instructions to:

first, smooth the image using a sharply peaked filter to produce a smoothed image;

09/588,292

Atty Docket: 10559-398001/P10335

detect an edge in the smoothed image; and
perform lowpass filtering using a high frequency cutoff filter on the smoothed image to produce an enhanced image, wherein lowpass filtering is performed only on non-edge areas of the smoothed image as determined by the edge detection.

Claim 22. (original) The apparatus of claim 21, wherein smoothing comprises:
applying a two-dimensional filter to a pixel in the image;
storing a pixel processed by the two-dimensional filter in the smoothed image; and
repeating storing and applying for one or more other pixels in the image.

Claim 23. (original) The apparatus of claim 21, wherein performing lowpass filtering comprises:

applying a one-dimensional filter to a pixel in the smoothed image;
storing a pixel processed by the one-dimensional filter in the enhanced image; and
repeating storing and applying for one or more other pixels in the smoothed image.

Claim 24. (canceled)

Claim 25. (canceled)

Claim 26. (original) The apparatus of claim 25, wherein detecting the edge comprises applying an edge filter to the smoothed image.

Claim 27. (currently amended)

An apparatus for enhancing an image, comprising:
a memory that stores executable instructions; and
a processor that executes the instructions to:

first, smooth the image using a sharply peaked filter to produce a smoothed image; and

09/588,292

Atty Docket: 10559-398001/P10335

perform lowpass filtering using a high frequency cutoff filter on the smoothed image to produce an enhanced image,

wherein the processor executes instructions to apply a median filter to the enhanced image, and wherein the median filter is designed to reduce artifacts on the enhanced image.

Claim 28. (currently amended) The apparatus of claim 27, wherein the processor further comprises instructions to detect edge areas in the smoothed image, wherein the median filter is applied only to non-edge areas of the enhanced image.

Claim 29. (currently amended) An apparatus for performing inverse halftoning on a halftoned image, comprising:

a memory that stores executable instructions; and

a processor that executes the instructions to:

first, smooth the halftoned image using a sharply peaked two-dimensional filter to produce a smoothed image;

detect edge areas in the smoothed image;

perform lowpass filtering using a high frequency cutoff filter on non-edge areas of the smoothed image; and

generate an enhanced image comprised of the edge areas of the smoothed image and lowpass-filtered non-edge areas of the smoothed image.

Claim 30. (original) The apparatus of claim 29, wherein the processor executes instructions to apply a median filter to non-edge areas of the enhanced image; and the median filter is designed to reduce artifacts in the enhanced image.

Claim 31. (currently amended) The method of claim 7, further comprising: detecting an edge in the smoothed image before performing lowpass filtering.

09/588,292

Atty Docket: 10559-398001/P10335

Claim 32. (previously added) The method of claim 31, wherein lowpass filtering is performed only on non-edge areas of the smoothed image, and wherein detecting the edge comprises applying an edge filter to the smoothed image.

Claim 33. (previously added) The apparatus of claim 27, wherein the processor executes instructions to detect an edge in the smoothed image.

Claim 34. (previously added) The apparatus of claim 33, wherein lowpass filtering is performed only on non-edge areas of the smoothed image, and wherein detecting the edge comprises applying an edge filter to the smoothed image.

Claim 35. (new) The method as recited in claim 1, wherein the method of enhancing an image is performed in one pass.

Claim 36. (new) The method as recited in claim 6, wherein detecting an edge further comprises comparing a predetermined threshold with results of edge filtering, and wherein edge values determined by the edge filtering that exceed the threshold are ignored during lowpass filtering.